would be less than that indicated. After thorough consideration of both factors, knowledge of the dependability and efficiency of the trappers and fumigators, and the general conditions attending both the fumigation and trapping of vessels, the writers are of the belief that the one source of error will offset the other, and that the percentages of efficiency indicated in Table 1 and Table 2 are trustworthy.

It is apparent that sulphur fumigation is not effective for the destruction of rats on loaded vessels or in superstructures. Whether this deficiency can be remedied by an increase in the amount of sulphur used or in prolonging the exposure, or whether a change in the procedure would be justifiable in the face of results of cyanide fumigation, are problems requiring further consideration.

The effectiveness of cyanide gas when used according to the tentative standards now in practice seems sufficient for empty holds and superstructures. It would seem probable, however, that in vessels with cargo-laden holds either a greater strength of the gas is required or a more prolonged duration of exposure. It is not to be expected, however, that any method of fumigation can result in 100 per cent efficiency.

Judging from the results of our observations it would appear that the fumigation of engine and fire rooms can, under ordinary conditions, be omitted, without materially reducing the effectiveness of the destruction of rodents on vessels. The omission of the fumigation of these compartments on 99 vessels apparently resulted in the escape of 1½ per cent of the rodent inhabitants, but inasmuch as it seems probable that in ordinary practice the efficiency of fumigation can not be expected to exceed 96 per cent, the addition of 1½ per cent in effectiveness seems immaterial. In exceptional cases, such as demonstrable plague infection on board vessels, it is believed that the engine and fire rooms should be included in the procedure.

TETANUS IN COURT-PLASTER.

RESULTS OF THE BACTERIOLOGICAL EXAMINATION OF 14 SPECIMENS.

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So much has appeared in the public press about alleged intentional contaminations of court-plaster with tetanus, and so many inquiries have reached this laboratory on the same subject, that the following record of our experience with the examination of court-plaster is presented.

We have no evidence whatever that any specimen we examined was deliberately contaminated. Indeed, so far as our work goes, we do

not have clear evidence that the court-plaster as it leaves the manufacturer carries the organism of tetanus; but we have proved that when the plaster reaches the user this organism may be present.

Source of Material.

The first specimen submitted for examination came from a State department of health. This specimen did not bear the name of the maker, though it did bear that of the distributor.

When work on this specimen indicated that tetanus was present, but before the results could be considered conclusive, we secured 13 other specimens by purchase from local pharmacies. Two of these specimens showed the presence of the tetanus organism.

Technique.

The medium we used for the cultivation was plain broth made from veal. The reaction was +0.5 per cent to phenolphthalein. The broth was sterilized in Smith fermentation tubes by streaming steam for 1½ hours at 100° C. Just prior to use, these were steamed for 30 minutes at 100° C. in the Arnold sterilizer and the air was removed by tilting.

The court-plaster was cut into pieces about 1 centimeter square, or a little larger, and one piece put into each fermentation tube. After incubating for three or four days, smears were made from the growth at the bottom of the bend of the tubes in which gas was present in the closed arm. When the Gram staining showed that characteristic drumstick-shaped organisms with a terminal spore were present, the culture was incubated for three days longer, at which time it was used to inoculate mice. In the majority of cases two series of animals (mice) were used, one having been given a protective dose of antitetanus serum.

A pure culture of the tetanus bacillus was isolated from one of the tubes by planting dilutions in deep tubes of melted agar and picking characteristic colonies.

Summary of Experiments.

Specimen 1. In all, 64 fermentation tubes were inoculated with small pieces of court-plaster, using three sheets. Thirty-three of these showed gas in the closed arm of the tube after three days. Smear preparations showed tetanuslike organisms in the great majority of the tubes showing gas.

A small amount of the culture, 0.01 cubic centimeter to 1 cubic centimeter from each tube, was used to inoculate each white mouse. Thirty-seven of the animals died during the ensuing night, but it was not known whether characteristic symptoms preceded death.

However, four showed distinct symptoms of tetanus in from 18 to 42 hours.

While we felt certain that the tetanus germ was present, it was realized that the evidence was not wholly convincing, and resort was had to protection tests, as is shown by the following protocol. The most promising tubes, judged by gross and microscopical appearance, were selected for the test. Each of the "protected" animals was given 10 units of commercial antitetanus serum about 30 minutes before the inoculation with cultures.

	Guinea pigs.			White mice.		
Tube No.	Volume of culture given.	Protected (10 units of antitoxin), results.	Controls (no antitoxin), symptoms, and results.	Volume of culture given.	Protected (10 units of antitoxin), results.	Controls (no antitoxin), symptoms, and results.
B 6	c. c. 0.1	No symptoms; discharged well twenty-second day.	Tetanus; died second day.	c. c. 0.1	No symptoms of tetanus; died sixth day.	Tetanus under 17 hours; died 18 hours.
	.01	.....do.....	Tetanus; died third day.	.01	.....do.....	Tetanus; died second day.
	.001	.....do.....	Remained well...	.001	Died under 17 hours; symptoms not observed.[1]	Slight symptoms 44 hours; severe later; chloroformed; moribund sixth day.
P 8[2]	.1	.....do.....	Tetanus; died second day.	.1	No symptoms of tetanus; died fourteenth day.	Died under 17 hours; symptoms not observed.
	.01	.....do.....	Tetanus; killed second day while moribund.	.01	No symptoms of tetanus; died sixth day.	Do.
	.001	.....do.....	Tetanus; died third day.	.001	No symptoms of tetanus; died seventh day.	Tetanus; died second day.
	.0001	.....do.....	Remained well...	.0001	No symptoms of tetanus; died fifteenth day.	Symptoms fourth day; marked sixth day.
P 9	.1	.....do.....	Tetanus; died second day.	.1	No symptoms of tetanus; died sixth day.	Dead under 17 hours; symptoms not observed.
	.01	.....do.....	Tetanus; killed third day while moribund.	.01	.....do.....	Tetanus under 17 hours; died second day.
	.001	.....do.....	Remained well...	.001	.....do.....	Symptoms second day; marked sixth day.

[1] Cause of death unknown. Had the cause of death been tetanus, the mouse receiving the largest dose of culture should have died, not the one on the smallest dose.
[2] Later this tube yielded a pure culture of the tetanus organism.

Specimens 2 to 14 (inclusive): These specimens were purchased at various drug stores in Washington. Culture tubes were inoculated as in the preceding experiment; however, but two fermentation tubes were inoculated from each package. On the third day after planting smears were examined, and on the sixth day the

material was used to inoculate a series of "protected" and a series of normal white mice, with results which are shown in the following table. On account of shortage of mice, fewer were used than in the preceding examination.

Mice.

Specimen.	Smears from fermentation tubes on third day.	Dose of culture (sixth day).	"Protected" (10 units of antitoxin), results.	Controls (no antitoxin), symptoms, results.
		Cc.		
2	Negative	None.		
3	Tetanuslike organisms.	None.		
4	do	0.1	Negative; discharged fifteenth day.	Negative; discharged fifteenth day.
		.01	do	Do.
5	Negative	None.		
6	Tetanuslike organisms.	.1	Negative; discharged fifteenth day.	Dead under 18 hours; symptoms not observed.
		.01	do	Symptoms of tetanus after 24 hours; died third day.
7	do	.1	do	Negative; discharged fifteenth day.
		.01	do	Died seventh day; not tetanus.
8	do	.1	do	Negative; discharged fifteenth day.
		.01	do	Do.
9	do		do	Dead under 18 hours; symptoms not observed.
			do	Do.
10	Negative	None.		
11	Suspicious	None.		
12	do	None.		
13	Negative	None.		
14	Suspicious	.1	Negative; discharged fifteenth day.	Negative; discharged fifteenth day.
		.01	do	Do.

This series demonstrated that specimen 6 was contaminated with tetanus. The symptoms in the mouse given 0.01 cubic centimeter of culture were quite characteristic.

As both of the control mice inoculated with culture No. 9 died in the night following the day of inoculation without symptoms being observed, a series was inoculated with the seven-day culture and included smaller doses than in the preceding experiment. The "protected" mice received the usual dose, 10 units of antitetanus serum.

Dose of culture 9.	Protected (10 units of antitoxin), symptoms and results.	Controls (no antitoxin), symptoms and results.
cc.		
0.1	Symptoms suggestive of tetanus 2, 3, and 4 days; recovered. Discharged well fourteenth day.	Pronounced symptoms tetanus, 18 hours; died, between 28 and 42 hours.
.01	Negative; discharged fourteenth day	Pronounced symptoms tetanus, 42 hours; dead, 45 hours.
.001	do	Slight symptoms tetanus fourth to eighth day; recovered.
.0001	do	No symptoms.

It would seem that the antitoxin failed to neutralize completely the 0.1 cubic centimeter dose of culture.

This series demonstrated that culture 9 also contained tetanus, which with the positive results from culture 6 gave 2 positives among the 13 specimens. We consider it not improbable that had a larger number of pieces of plaster been planted, as was done with specimen 1, a larger number of positive results would have been secured.

NOTE.—In order to determine approximately the degree of contamination of court-plaster with aerobic organisms, four specimens were examined in the following manner: A single sheet of the size found in the package was shaken with 100 cubic centimeters of sterile 0.6 per cent sodium chloride solution, and 1 cubic centimeter of the suspension plated on plain agar. Colonies were counted after three days. The number of organisms per sheet was estimated as follows:

Specimen 1	1,300
Specimen 2	2,700
Specimen 3	1,500
Specimen 4	7,000

No attempt was made to identify the organisms.